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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/581,281	05/31/2006	Larry C. Olsen	23-65037-09	3124
32215 7590 01/20/2012 KLARQUIST SPARKMAN, LLP 121 SW SALMON STREET, SUITE 1600 ONE WORLD TRADE CENTER PORTLAND, OR 97204				
EXAMINER				
MOWLA, GOLAM				
ART UNIT		PAPER NUMBER		
1723				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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**Office Action Summary****Application No.**

10/581,281

**Applicant(s)**

OLSEN ET AL.

**Examiner**

GOLAM MOWLA

**Art Unit**

1723

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 November 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 5) ☒ Claim(s) 37-66 is/are pending in the application.
- 5a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 37-66 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 10) ☒ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-893)  
Paper No(s)/Mail Date 11/11/2011 and 12/15/2011
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendment of 11/11/2011 does not place the Application in condition for allowance.
2. Claims 37-66 are currently pending. Applicant has amended claim 37, and cancelled claims 1-36 and 37-85.

### ***Status of the Rejections***

3. The double-patenting rejection of claims 37-66 is withdrawn in view of the terminal disclaimer filed on 11/11/2011 and approved on 12/16/2011.
4. The prior-art rejection of claims 50-66 from the Office Action mailed on 08/11/2011 is maintained.

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 37-66 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant

art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claim 37-49, there is no support in the original specification of the instant application, the specification of the PCT Application PCT/US04/40460, the specification of the parent application 10/726,744, the specification of the parent application 10/727,062, or the specification of the provisional application 60/558,298 for “the p-type or the n-type thermoelements comprise  $\text{Bi}_x\text{Te}_y$ ,  $\text{Sb}_x\text{Te}_y$ , or  $\text{Bi}_x\text{Se}_y$  wherein x and y form a non-stoichiometric compound wherein x is about 2 and y is about 3” as recited in lines 10-11 of claim 37. Although applicant contends that p. 6, lines 13-14 and lines 25-27; p. 14, lines 1-3; p. 10, lines 6-10; p. 12, line 28 - p. 13, line 5; Fig. 11 and Examples 1 and 2 of the original specification provide support for the thermoelement being non-stoichiometric, it is noted that nowhere in the portion as cited by the applicant disclose that the thermoelement could be non-stoichiometric. On page 14, lines 1-3 of the original disclosure only mentions that the x and y could vary, but this does not support that the thermoelement could be non-stoichiometric. One skilled in the thermoelectric art realizes that both x and y could vary by keeping the stoichiometric ratio between the elements keeping the same. Also, examples 1 and 2 explicitly show that the thermoelement ( $\text{Sb}_2\text{Te}_3$  or  $\text{Bi}_2\text{Te}_3$ ) is stoichiometric. If the thermoelements were not stoichiometric, the ratio between Sb and Te or between Bi and Te would not be 2:3. Applicant is requested to provide support for this limitation.

Regarding claims 50-66, there is no support in the original specification of the instant application, the specification of the PCT Application PCT/US04/40460, the specification of the parent application 10/726,744, the specification of the parent application 10/727,062, or the

specification of the provisional application 60/558,298 for "the apparatus not including an electrical and/or mechanical power device, other than gravity, external to the high temperature heat pipe acting on the working fluid to transfer heat to and from the thermoelectric device" as recited in claim 50, lines 11-13. Instant application as originally filed fails to disclose whether the use of an external electrical or mechanical power device is precluded. Applicant is requested to provide support for this limitation.

***Claim Rejections - 35 USC § 103***

7. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
8. Claims 50-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over Migowski (WO 89/07836) in view of Simeray et al. (US 6,340,787), Stachurski (US 4125122) and Bass et al. (US 6,207,887).

Regarding claims 50-51 and 57, Migowski in figures 2-4 teaches an apparatus for generating electrical energy (thereby functions in Seebeck mode) from an environment having a first temperature region (7) and second temperature region (7) comprising thermoelectric device (5) having a first side in communication with the first temperature region (7) and a second side in communication with the second temperature region (7). Migowski further discloses the thermoelectric device comprises discrete thin film thermoelements (n-type and p-type thermoelement) (see fig. 2) formed of semiconductors (3rd full paragraph of page 3). Migowski et al suggest use of their thermoelectric generator for general "power supply units, etc" (Page 3, 6th full paragraph).

However, the reference is silent as to the use of high-temperature and low-temperature heat pipes connected to a hot connection and cold connection of the thermoelectric device, respectively.

Simeray et al. teach low-power thermoelectric generation using small temperature gradients, as used by Migowski et al, specifically teaching that the first and second temperature regions can be the ground and the air above the ground (Figure 6; Column 6, lines 17-30) or air inside a building and air outside a building. (Figure 5, Column 6, lines 10-16). Simeray et al disclose a heat pipe (74) connected to the first end and buried in the ground (Figure 6), a second heat pipe (73) coupled to the second end. Such a "heat exchanger" and "thermal collection stake" read on the instant heat pipes, as they conduct heat to the respective hot and cold junctions.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the method of Migowski by employing the generators in locations such as between the ground and air, or in a wall of a building, as taught by Simeray, because Simeray teaches that such locations provide suitable temperature gradients for low power thermoelectric generators and Migowski suggests that his generators may be used generally in power supply units. Such a combination will provide the predictable result of successfully generating power.

However, the references are silent as to the use of a working fluid in order to transfer heat to and from the thermoelectric device.

It is well known in the thermoelectric art to utilize a working fluid which goes through phase change from liquid to vapor or vapor to liquid state in order to deliver the heat to and/or from the TE module as taught by Stachurski (see figures, col. 2, lines 12-29, and col. 3, line 67 to

col. 4, line 52) (see abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a working fluid which goes through a phase change as taught by Stachurski in the apparatus of Migowski in order deliver the heat to and/or from the TE device to convert the heat to electricity.

Migowski as modified does not explicitly disclose that the thin film thermoelements are assembled in alternating p- and n-type arrays.

Bass et al disclose a series-parallel connection scheme for a thermoelectric generator (Figure 13A; Column 6, lines 46-62) in which plural n-type elements are connected electrically in parallel and are connected in series to a plurality of p-type elements that are connected to each other in parallel. Four thermoelements are present in each resulting couple.

It would have been obvious to one having ordinary skill in the art to modify the method of Migowski by employing the series-parallel connection scheme of Bass et al, because Bass et al teach that such connection protects against complete power loss in the event of damage to a single thermoelement, thus providing increased reliability (Column 6, lines 46-62).

Regarding claim 52, the limitation "the thermoelectric device comprises metallic wire thermocouples..." is optional to the apparatus of claim 50. Since Migowski as modified explicitly teaches the use of discrete element semiconductors assembled in alternating p-type and n-type) arrays (see fig. 2), the instant claim is rejected.

Regarding claim 53, Migowski as modified further discloses the thin film thermoelectric elements are connected in series (see Bass et al.).

Regarding claims 54-56, Migowski further teaches forming the p- and n-type thermocouples from Bi, Te, Sb, Se, or Pb (3rd full paragraph of page 3). As bismuth telluride and

other claimed compounds are conventional thermoelectric materials, selection of these known materials based on this listing would have been obvious to one having ordinary skill in the art. Migowski further discloses sputter deposition of the thermoelements (1st full paragraph on page 3).

Regarding claims 58-59, Migowski further discloses the means for transmitting ambient energy is an ambient energy transmission means by conduction means (see fig. 3 and last full paragraph on page 4).

Regarding claims 60-62, Migowski further discloses the apparatus being used in a sensor system and comprises a battery or capacitor for alternately storing and discharging electrical energy produced by the thermoelectric devices (see paragraph bridging pages 2 and 3; 7<sup>th</sup> full paragraph on page 3 starting "In addition to the use..."; 7<sup>th</sup> full paragraph on page 4 starting "It is also conceivable...").

9. Claims 50-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Albsmeier et al. (WO 02/095707) in view of Migowski (WO 89/07836), Simeray et al. (US 6,340,787), Stachurski (US 4,125,122) and Bass et al. (US 6,207,887).

Regarding claims 50-66, Albsmeier is directed to an apparatus for generating electrical energy (Figure 1) from an environment having a first temperature region and a second temperature region comprising a thermoelectric device (1) having a first side and a second side wherein the first side is in communication with a means for transmitting ambient thermal energy collected in the first temperature region (see abstract). Albsmeier further teaches the apparatus further comprising a means for alternately storing and discharging electrical energy produced by



the thermoelectric device consisting of a capacitor (7), at least one sensor powered by electrical energy from the capacitor (8), at least one transmitter powered by the capacitor and capable of transmitting data gathered by the sensor (5, 6), a voltage amplified for amplifying the voltage of electrical energy generated by the thermoelectric device (3), and one microprocessor capable of processing the data and data storage means capable of storing the data (4) (see abstract and Figure 1).

However, the reference is silent as to the disclosure of the thermoelectric device (1).

Migowski in view of Simeray, Stachurski and Bass, as discussed above, discloses an apparatus for generating electrical energy wherein the thermoelectric device is according to claims 50-62 (see full description above) and further discloses that it can be used in a sensor system (see 7<sup>th</sup> full paragraph on page 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized the thermoelectric device of Migowski in view of Simeray and Stachurski in the apparatus of Albsmeier, because the thermoelectric device of Migowski in view of Simeray and Stachurski generates enough electric power and voltage, as taught by Migowski in view of Simeray and Stachurski.

### ***Response to Arguments***

10. Applicant's arguments with respect to claims 37-66 have been considered but are moot in view of the new ground(s) of rejection as necessitated by the amendments.

In response to Applicant's argument on pages 1 and 2 of Remarks regarding new matter, it is noted that instant application as originally filed **fails to disclose** whether the use of an

external electrical or mechanical power device is **precluded**. Applicant is requested to provide support for this limitation.

On page 8 of Remarks, Applicant argues that Simeray fails to disclose heat pipes as required by the claims 50-66.

The examiner respectfully disagrees. Simeray et al. teach low-power thermoelectric generation using small temperature gradients, as used by Migowski et al, specifically teaching that the first and second temperature regions can be the ground and the air above the ground (Figure 6; Column 6, lines 17-30) or air inside a building and air outside a building. (Figure 5, Column 6, lines 10-16). Simeray et al disclose a heat pipe (74) connected to the first end and buried in the ground (Figure 6), a second heat pipe (73) coupled to the second end. Such a "heat exchanger" and "thermal collection stake" read on the instant heat pipes, as they conduct heat to the respective hot and cold junctions.

### *Conclusion*

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Correspondence/Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GOLAM MOWLA whose telephone number is (571) 270-5268. The examiner can normally be reached on M-Th, 0800-1830 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, ALEXA NECKEL can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/G. M./  
Examiner, Art Unit 1723

/Alexa D. Neckel/  
Supervisory Patent Examiner, Art Unit 1723